

CLAIMS

1. In an amplifier apparatus in which a signal is amplified by an amplifier and distortion produced by the amplifier is compensated
5 for,

an amplifier apparatus characterized by comprising
distortion component amplitude detection means that detects
an amplitude of a distortion component produced by an amplifier
contained in a signal amplified by an amplifier after distortion
10 compensation, and

amplified signal level reduction control means that in a case
in which the amplitude of the distortion component detected by the
distortion component amplitude detection exceeds a predetermined
threshold value, performs control to reduce the level of the signal
15 amplified by the amplifier.

2. An amplifier apparatus according to claim 1,
characterized in that means for compensating for distortion
produced by an amplifier comprises predistortion means that generates
distortion with respect to a signal prior to amplification by an
20 amplifier, and predistortion control means that controls the distortion
generated by the predistortion means based on the amplitude of the
distortion component detected by the distortion component amplitude
detection means.

3. An amplifier apparatus according to claim 1 or 2,
25 characterized in that the amplified signal level reduction control
means performs control to reduce a level of a signal amplified by
an amplifier by performing control to have the signal attenuated
prior to amplification by a variable attenuator provided in the stage
before the amplifier.

30 4. An amplifier apparatus according to claim 1 or 2,
characterized in that the amplified signal level reduction control
means performs control to reduce a level of a signal amplified by
an amplifier by performing control to have the signal attenuated

after amplification by a variable attenuator provided in the stage after the amplifier.

5 5. An amplifier apparatus according to claim 1 or 2,
characterized in that the amplified signal level reduction control
means performs control to reduce a level of a signal amplified by
an amplifier by performing control to change the gain of an amplifier
constituted as a variable-gain amplifier.

10 6. An amplifier apparatus according to claim 1 or 2,
characterized in that the distortion component amplitude
detection means detects as the distortion component amplitude an
integrated value of distortion component levels detected in a
predetermined period.

15 7. An amplifier apparatus according to claim 1 or 2,
characterized in that the distortion component amplitude
detection means detects as the distortion component amplitude an
average temporal value of distortion component levels detected in
a predetermined period.

20 8. An amplifier apparatus according to claim 3,
characterized by comprising a variable attenuator, delayer,
predistortion circuit, amplifier, envelope detector, compensation
table, sideband power detector, integrator, and controller,

wherein a signal that is an object of amplification is input
to the variable attenuator and the envelope detector,

25 the variable attenuator attenuates the input signal by an
attenuation amount controlled by the controller, and outputs the
attenuated signal to the delayer,

the delayer delays the signal input from the variable attenuator
by a predetermined delay time and outputs it to the predistortion
circuit,

30 the predistortion circuit adjusts the amplitude of the signal
input from the delayer by attenuating the signal by an attenuation
amount that is based on a compensation data signal relating to amplitude
adjustment input from a compensation table, and adjusts the phase

of the signal by a phase change amount that is based on a compensation data signal relating to phase compensation input from a compensation table, and outputs the amplitude-and-phase-adjusted signal to the amplifier,

5 the amplifier amplifies the signal input from the predistortion circuit and outputs the amplified signal,

 the envelope detector detects the envelope of the input signal and outputs envelope information to the compensation table,

 the compensation table contains correspondences between the
10 envelope information and compensation data relating to amplitude adjustment by the predistortion circuit, and also contains correspondences between the envelope information and compensation data relating to phase adjustment by the predistortion circuit, and
 outputs to the predistortion circuit a compensation data signal
15 relating to amplitude adjustment and a compensation data signal relating to phase adjustment corresponding to the envelope information input from the envelope detector,

 the sideband power detector detects from input of a portion of the signal output from the amplifier, sideband signal power that
20 becomes leakage power to adjacent channels in the transmission output, and outputs the detection result to the integrator,

 the integrator performs fixed-time-period integration of the results input from the sideband power detector and outputs the integration result to the controller,

25 based on the integration result input from the integrator, the controller updates compensation data relating to amplitude adjustment and compensation data relating to phase adjustment contained in the compensation table to decrease the integration value input from the integrator, and also performs control to increase the attenuation
30 amount of the variable attenuator in a case in which an integration value input from the integrator exceeds a preset threshold value.

9. An amplifier apparatus according to claim 4,

 characterized by comprising a delayer, predistortion circuit,

variable attenuator, amplifier, envelope detector, compensation table, sideband power detector, integrator, and controller,

wherein a signal that is an object of amplification is input to the delayer and the envelope detector,

5 the delayer delays the input signal by a predetermined delay time and outputs it to the predistortion circuit,

the predistortion circuit adjusts the amplitude of the signal input from the delayer by attenuating the signal by an attenuation amount that is based on a compensation data signal relating to amplitude
10 adjustment input from the compensation table, and adjusts the phase of the signal by a phase change amount that is based on a compensation data signal relating to phase compensation input from the compensation table, and outputs the amplitude-and-phase-adjusted signal to the variable attenuator,

15 the variable attenuator attenuates the signal input from the predistortion circuit by an attenuation amount controlled by the controller, and outputs the attenuated signal to the amplifier,

the amplifier amplifies the signal input from the variable attenuator and outputs the amplified signal,

20 the envelope detector detects the envelope of the input signal and outputs envelope information to the compensation table,

the compensation table contains correspondences between the envelope information and compensation data relating to amplitude adjustment by the predistortion circuit, and also contains
25 correspondences between the envelope information and compensation data relating to phase adjustment by the predistortion circuit, and outputs to the predistortion circuit a compensation data signal relating to amplitude adjustment and a compensation data signal relating to phase adjustment corresponding to the envelope information
30 input from the envelope detector,

the sideband power detector detects from input of a portion of the signal output from the amplifier, sideband signal power that becomes leakage power to adjacent channels in the transmission output,

and outputs the detection result to the integrator,

the integrator performs fixed-time-period integration of the results input from the sideband power detector and outputs the integration result to the controller,

5 based on the integration result input from the integrator, the controller updates compensation data relating to amplitude adjustment and compensation data relating to phase adjustment contained in the compensation table to decrease the integration value input from the integrator, and also performs control to increase the attenuation
10 amount of the variable attenuator in a case in which an integration value input from the integrator exceeds a preset threshold value.

10. An amplifier apparatus according to claim 5,

characterized by comprising a delayer, predistortion circuit, an amplifier constituted as a variable-gain amplifier, envelope
15 detector, compensation table, sideband power detector, integrator, and controller,

wherein a signal that is an object of amplification is input to the delayer and the envelope detector,

the delayer delays the input signal by a predetermined delay
20 time and outputs it to the predistortion circuit,

the predistortion circuit adjusts the amplitude of the signal input from the delayer by attenuating the signal by an attenuation amount that is based on a compensation data signal relating to amplitude adjustment input from the compensation table, and adjusts the phase
25 of the signal by a phase change amount that is based on a compensation data signal relating to phase compensation input from the compensation table, and outputs the amplitude-and-phase-adjusted signal to the amplifier,

the amplifier amplifies the signal input from the predistortion
30 circuit at a gain controlled by the controller and outputs the amplified signal,

the envelope detector detects the envelope of the input signal and outputs envelope information to the compensation table,

the compensation table contains correspondences between the envelope information and compensation data relating to amplitude adjustment by the predistortion circuit, and also contains correspondences between the envelope information and compensation data relating to phase adjustment by the predistortion circuit, and outputs to the predistortion circuit a compensation data signal relating to amplitude adjustment and a compensation data signal relating to phase adjustment corresponding to the envelope information input from the envelope detector,

the sideband power detector detects from input of a portion of the signal output from the amplifier, sideband signal power that becomes leakage power to adjacent channels in the transmission output, and outputs the detection result to the integrator,

the integrator performs fixed-time-period integration of the results input from the sideband power detector and outputs the integration result to the controller,

based on the integration result input from the integrator, the controller updates compensation data relating to amplitude adjustment and compensation data relating to phase adjustment contained in the compensation table to decrease the integration value input from the integrator, and based on the integration value input from the integrator, also controls the amplifier to reduce the amplifier gain in a case in which an integration value input from the integrator exceeds a preset threshold value.

11. In a communication station apparatus of a mobile communication system,

a communication station apparatus of a mobile communication system characterized by comprising

an amplifier apparatus in which a signal is amplified by an amplifier and distortion produced by the amplifier is compensated for,

the amplifier apparatus comprising distortion component amplitude detection means that detects an amplitude of a distortion

component produced by an amplifier contained in the signal amplified by the amplifier after distortion compensation, and amplified signal level reduction control means that in a case in which the amplitude of the distortion component detected by the distortion component amplitude detection exceeds a predetermined threshold value, performs control to reduce the level of the signal amplified by the amplifier.

12. A communication station apparatus of a mobile communication system according to claim 11, characterized in that the amplifier apparatus comprises means for compensating for distortion produced by an amplifier comprising predistortion means that generates distortion with respect to a signal prior to amplification by an amplifier, and predistortion control means that controls the distortion generated by the predistortion means based on the amplitude of the distortion component detected by the distortion component amplitude detection means.